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REVIEWS

THE LIFE OF THE PLEISTOCENE OR GLACIAL PERIOD[1]

As Kennard and Woodward in their valuable paper on "The Post-pliocene Non-marine Mollusca of Ireland" (Proc. Geol. Ass., XXVIII, pp. 109–190, 1917) have well said "there are few groups of animals, which are of more importance to the naturalist, or to the geologist, than the non-marine mollusca."

This is particularly true in the study of glacial history. From the very nature of the case the remains of the mollusca, especially the fresh-water species, form much the larger proportion of the fossils found in Glacial deposits. Other and higher forms of life are simply waifs and strays from their original environment; but the fluviatile mollusca were overtaken and buried in their natural surroundings and consequently present a much more perfect picture of the life existing at the time of their extinction than any other group.

"The Life of the Pleistocene" is a notable contribution to our knowledge of the Glacial Period in this country. It is the first attempt to coordinate the zoological side of the subject with the geological and thus present a comprehensive view of the ecological conditions that accompanied the successive advances and retreats of the ice-sheet.

The work is divided into two parts: In the first, the author, after a brief historical review of the work that had been done on the Chicago Basin from 1868 to 1918, proceeds with a detailed study of that area with particular reference to Glacial Lake, Chicago, its history, its successive beaches and its biota. He then takes up the post-glacial biota of the Great Lake Region and concludes with a "review of the records of life outside the area and influence of the Great Glacial Lakes.

To the systematist and the ecologist the predominent features, which attract attention in this portion of the work, speaking with special reference to the mollusca, are:

I. That the fauna of the Glacial Period was practically the same as that existing at the present time. Of 298 species listed, only five[2] are non-existent at the present time.

It is apparent that our present fauna in its essential features was fully differentiated before the advent of the ice. The fact that it remained substantially intact during all of the fluctuations of the Glacial Period shows that the ecological conditions during that period were not sufficient to affect the specific integrity of the fauna, and it would seems to follow that the environmental conditions under which the fauna existed prior to, during, and after that time must have been substantially the same or, at least, not sufficiently different to affect the lower forms of life (plants, mollusca and crustacea). Whether the peculiar conditions of the period or some other cause, not yet ascertained, brought about the extinction of the larger part of the existent Insecta and Vertebrata is, perhaps, a subject of inquiry for students in those particular groups.

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[1] Baker, Frank C. University of Illinois Bulletin, Vol. XVII, No. 41, pp. xiv–476, Pls. I–LVII, Urbana, 1920.

[2] *Lymnæa galbana* Say, listed as extinct, is still found living in many localities. See Baker, "Lymnidæ of North America," p. 291, 1911.

II. There is no doubt but that the advance of the ice-sheet extinguished all of the pre-glacial fauna that was not able to retreat before it to the unglaciated region in the south. As Pilsbry has said there must have been all through the Glacial Period a vast accumulation of such northern species as succeeded in retreating before the ice in the region immediately south of the ice-sheet and from this refuge the fauna returned to the north whenever and wherever the retreat of the ice afforded opportunity. The southern lines of communication probably remained substantially the same and the wave of life surged, forwards and backwards, through these ancient waterways, advancing as the ice retreated and retiring again as the ice-sheet returned, but always ready to push back toward the north whenever conditions permitted.

III. Upon the final retreat of the ice-cap the biota again spread into the glaciated region and ultimately obtained the lodgement that it occupies at the present time. There can be no question but that the several post-glacial drainage systems from the various, successive glacial lakes were the channels through which the fauna, so long cantoned south of the ice-sheet, spread northward and occupied the new and barren drainage areas that resulted from the action of the ice. Thus it has been shown that the present distribution of the Unionidæ in Michigan and the remarkable and unique distribution of the Unione fauna of the Great Lakes can be traced to the opportunities afforded by the shifting post-glacial systems of drainage that carried the water to the south so long as the present northeastern outlet was blocked by the retreating glacier. And it seems probable that, as our knowledge of the details of the distribution of the fauna during the successive retreats of the ice and of the post-glacial drainage systems increases, many of the apparent anomalies in the present distribution of our fauna can be explained.

The second part of the work is given to a " review of our present knowledge concerning the life of the glaciated area during the Glacial Period."

One of the great drawbacks to the systematic zoologist in any attempt to study the life of this period has been the fact that the data have been scattered through many geological reports, not always accessible and only to be obtained by special bibliographic research for which time is not to be had. This long-felt want has been supplied by the exhaustive review of the literature and summaries of its data, which the industry of the author has compiled. It is a perfect mine of information and will be of invaluable service to every student who has occasion to seek information on the subject. A bibliography of 45 pages not only shows the enormous amount of literature that has been digested by the author, but also supplies the necessary data for checking his work and reviewing his conclusions. The running comments that accompany the summaries of the various papers reviewed are of value and interest and serve to connect up the scattered data into a consistent whole.

This portion of the book is concluded by a chapter of "suggestions for further study" and emphasizes not only the need for much additional work, but specially the absolute necessity for reliability of the records. If the collector is not competent to determine the exact period of the deposit which he has discovered, not only should the material obtained be preserved and deposited in some museum for future reference, but the exact location of the deposit should be so clearly specified that any subsquent investigator may be able to locate it and thus supply any defects in the original data. Too much stress can not be laid on this point. If the material is preserved, errors of identification can be corrected, but if the exact age of the deposit is not accurately determined, the value of the collection is absolutely ruined.

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